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*Preprint from the 1987*

BUREAU OF MINES MINERALS YEARBOOK

# The Mineral Industry of South Dakota

UNITED STATES DEPARTMENT OF THE INTERIOR

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This publication is a chapter from the current Bureau of Mines Minerals Yearbook, comprising *Volume I, Metals and Minerals; Volume II, Area Reports: Domestic; Volume III, Area Reports: International.* The separate volumes of the Yearbook are sold by the Superintendent of Documents, Washington, D.C. 20402.

# The Mineral Industry of South Dakota

**This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the South Dakota Geological Survey for collecting information on all nonfuel minerals.**

By Leon E. Esparza[1]

In 1987, the value of South Dakota's nonfuel mineral production reached a record $262.9 million, an increase of nearly 13% over the previous high established in 1986. The increase was due mainly to greater production of gold. Exploration for gold and other precious metals continued at a brisk pace. Twenty exploration permits were issued to 11 companies for projects in the Black Hills, in Custer, Lawrence, and Pennington Counties.

**Table 1.—Nonfuel mineral production in South Dakota[1]**

| Mineral | 1985 | | 1986 | | 1987 | |
|---|---|---|---|---|---|---|
| | Quantity | Value (thousands) | Quantity | Value (thousands) | Quantity | Value (thousands) |
| Cement: | | | | | | |
| Masonry thousand short tons | 4 | W | 4 | W | 4 | W |
| Portland do. | 655 | W | 635 | W | 519 | W |
| Clays[2] do. | 117 | $309 | 119 | $375 | W | W |
| Feldspar short tons | 13,721 | W | W | W | W | W |
| Gem stones | NA | e70 | NA | 100 | NA | $100 |
| Gold (recoverable content of ores, etc.) troy ounces | 356,103 | 113,119 | W | W | W | W |
| Gypsum thousand short tons | 34 | 269 | 31 | 268 | W | W |
| Sand and gravel (construction) do. | e6,400 | e16,000 | 9,713 | 19,853 | e9,600 | e19,100 |
| Silver (recoverable content of ores, etc.) thousand troy ounces | 63 | 388 | W | W | W | W |
| Stone: | | | | | | |
| Crushed thousand short tons | 4,071 | 14,412 | e3,600 | e12,600 | 5,070 | 18,515 |
| Dimension do. | 51 | 18,336 | e55 | e18,399 | 51 | 18,209 |
| Combined value of beryllium concentrates, clays (bentonite, 1985-86; common, 1987), lime, mica (scrap), and values indicated by symbol W | XX | 44,809 | XX | 181,291 | XX | 206,968 |
| Total | XX | 207,703 | XX | 232,886 | XX | 262,892 |

eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" figure. XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Excludes certain clays; kind and value included with "Combined value" data.

**Table 2.—Nonfuel minerals produced in South Dakota in 1986, by county[1]**

| County | Minerals produced in order of value |
|---|---|
| Aurora | Sand and gravel (construction). |
| Beadle | Do. |
| Bon Homme | Do. |
| Brookings | Do. |
| Brown | Do. |
| Brule | Do. |
| Buffalo | Do. |
| Butte | Clays, sand and gravel (construction). |
| Campbell | Sand and gravel (construction). |
| Charles Mix | Do. |
| Clark | Do. |
| Codington | Do. |
| Corson | Do. |
| Custer | Mica, feldspar, beryllium. |
| Davison | Sand and gravel (construction). |
| Day | Do. |
| Deuel | Do. |
| Douglas | Do. |
| Edmunds | Do. |
| Fall River | Do. |
| Faulk | Do. |
| Grant | Do. |
| Gregory | Do. |
| Haakon | Do. |
| Hamlin | Do. |
| Hand | Do. |
| Hanson | Do. |
| Harding | Do. |
| Hughes | Do. |
| Hutchinson | Do. |
| Hyde | Do. |
| Jackson | Do. |
| Jerauld | Do. |
| Jones | Do. |
| Kingsbury | Do. |
| Lake | Do. |
| Lawrence | Gold, sand and gravel (construction), silver. |
| Lincoln | Sand and gravel (construction). |
| Lyman | Do. |
| McCook | Do. |
| McPherson | Do. |
| Marshall | Do. |
| Meade | Do. |
| Mellette | Do. |
| Miner | Do. |
| Minnehaha | Do. |
| Moody | Do. |
| Pennington | Cement, lime, sand and gravel (construction), clays, gypsum. |
| Perkins | Sand and gravel (construction). |
| Potter | Do. |
| Roberts | Do. |
| Sanborn | Do. |
| Spink | Do. |
| Stanley | Do. |
| Sully | Do. |
| Todd | Do. |
| Tripp | Do. |
| Turner | Do. |
| Union | Do. |
| Walworth | Do. |
| Yankton | Do. |
| Ziebach | Do. |
| Undistributed[2] | Stone (dimension and crushed), gem stones. |

[1]No production of nonfuel mineral commodities was reported for counties not listed.
[2]Data not available by county for minerals listed.

**Trends and Developments.**—Objections to, and debate about, open pit gold mining and the use of cyanide heap-leaching methods continued to grow in 1987. In recent years, gold exploration for large low-grade deposits and open pit development had increased mainly because of improvements in cyanide heap-leach technology and a strong precious metals market.

Most of South Dakota's industrial mineral production was used by the construction industry. The U.S. Department of Commerce reported a modest construction decline in South Dakota in 1987. The number of private and public residential units authorized fell a little over 5% from 1986, and the value of nonresidential construction dropped about 4%. The value of State road contract awards paralleled this decline, falling about 10% for the same period.[2]

Mineral taxes in South Dakota are levied only on gold and silver production. Collections for fiscal year July 1, 1986, to June 30, 1987, totaled nearly $4.5 million, up about 18%.[3]

Mining employment totaled 2,626 in 1987, a slight increase over that of 1986.[4]

**Legislation and Government Programs.**—Laws enacted during the 1987 State legislative session had a major effect on mining in South Dakota. The legislative action ultimately resulted in a review and major redrafting of State mining regulations. Two laws in particular contributed to a need for the redraft. The first clarified the authority of local governments to enact zoning regulations relating to surface mining. The second law required the State Board of Minerals and Environment to make socioeconomic studies before issuing mine permits.

To comply with the new laws, the Governor ordered a 6-month hold, beginning in June, on processing mine permit applications and amendments. This action provided time for a Governor-appointed task force to draft new mining regulations. The task force consisted of members from academia, environmental advisory groups, the mining industry, and government. The new mining regulations unveiled in December included changes in permit procedures and rules for reclamation, heap leaching, and disposal of mill tailings.

In October, Lawrence County voters defeated by a greater than 3:1 margin a proposed moratorium on open pit gold mining. The moratorium would have delayed issuance of permits for new open pits until December 31, 1988, and also would have delayed major amendments to existing open pit mining permits. Part of the measure would have required the county commissioners to conduct a study of the cumulative effects of open pit mining. Local environmental groups continued efforts to include an open pit mining initiative on the 1988 statewide general election ballot. Although exact wording of the initiative was incomplete at yearend, the intent was to severely restrict growth of open pit projects in the Black Hills.

The proposed Sioux Nation Black Hills Act (U.S. Senate bill 705 and U.S. House bill 1506) was introduced in the 100th U.S. Congress. The stated purpose of the bill, which may affect the mining industry, was "to affirm the boundaries of the Great Sioux Reservation to convey federally held lands in the Black Hills to the Sioux Nation." The measure would return to the Sioux 1.3 million acres, which included nearly all Federal land in South Dakota, mostly west of longitude 103. All Federal lands in five counties and large parts of two counties would be included.

Although the proposed act indicated that individuals would not be deprived of valid existing rights of use or possession or any other contract right, there was disagreement whether these rights would be protected. Some observed that since the 1851 Treaty of Fort Laramie predates the Mining Law of 1872, existing mineral rights might not be valid.

The South Dakota School of Mines and Technology received nearly $72,000 from the State to study chlorination extraction for processing metallic ores. The study was to focus on gold-producing operations in the Black Hills and other Western States.

The U.S. Bureau of Mines distributed $205,000 to the State's Mining and Mineral Resources and Research Institute of the South Dakota School of Mines and Technology at Rapid City. The funds were provided as part of a program to assist the institute's efforts in training engineers and scientists in mineral-related disciplines.

## REVIEW BY NONFUEL MINERAL COMMODITIES

### METALS

**Beryllium.**—Pacer Corp. produced beryl, feldspar, and mica from pegmatite deposits in Custer County. Production and value of beryllium decreased from 1986.

**Gold and Silver.**—The second largest gold mine in the country was in South Dakota. The State ranked third of 14 States in gold production. Gold production and value in 1987 increased nearly 7% and 30%, respectively. Lawrence County was the location for all the major gold operations in South Dakota. Homestake Mining Co. (HMC) was the State's largest gold producer. Gold production from HMC's Open Cut and Homestake Mines at Lead totaled about 326,000 troy ounces. Gold ore reserves at the Open Cut totaled 6,560,000 short tons at 0.126 ounce per ton. Ore reserves at the Homestake Mine were 19,032,000 tons at 0.213 ounce of gold per ton. Average production costs for the mines increased to $328 per ounce in 1987, up from $285 in 1986 due to declines in underground ore grades and prestripping costs at the Open Cut operation.[5] Homestake also produced silver as a coproduct of mine operations.

Wharf Resources (U.S.A.) Inc., a wholly owned subsidiary of Wharf Resources Ltd., a Canadian company, continued surface mining at its Annie Creek-Foley Ridge deposit in Lawrence County west of Lead in the Bald Mountain mining district. Total gold production in 1987 was about 46,000 ounces. Direct mining costs were $189 per ounce. Ore reserves totaled about 24 million short tons at an average grade of 0.041 ounce of gold per ton.[6] Wharf also recovered silver as a coproduct. In December 1987, Dickenson Mines Ltd. notified Wharf that it had acquired about 29% of Wharf's voting common stock.

Brohm Resources Inc. began construction in July of its Gilt Edge Mine. Gold production at the open pit and cyanide heap-leach operation was anticipated to be 42,000 ounces per year, gradually increasing to 135,000 ounces per year by 1991. The company said reserves were about 44 million tons of ore grading 0.043 ounce of gold per ton.[7]

Golden Reward Mining Co. was a joint venture composed of Moruya Gold Mines (1983) NL of Australia, Coin Lake Gold Mines Ltd. of Canada, and Ventures Trident of Colorado. The company's efforts to obtain a State mining permit were delayed because of the Governor's moratorium. It expected to begin construction by the summer of 1988 if a permit is awarded. Company-reported reserves for the proposed open pit and cyanide heap-leach operation were 12.5 million tons of ore with an average grade of 0.053 ounce of gold per ton for a contained 670,000 ounces of gold and 2.5 million ounces of silver.[8]

Goldstake Explorations (SD) Inc., in a joint venture with Strawberry Hill Mining Co. of Deadwood, announced plans to reclaim about 6 million tons of old gold-bearing tailings along an 18-mile stretch of Whitewood Creek in Meade County south of Whitewood.[9] The area had been on the Environmental Protection Agency Superfund list because of elevated arsenic concentrations in tailings. The mining and milling operations dated back to the 1870's.[10]

The operation would use gravity concentration and/or cyanide heap-leach technology and carbon-in-pulp methods to recover gold that the company reported averaged 0.06 ounce per ton.

St. Joe Gold Corp. filed a mine permit application with the State in late September for its Richmond Hill project. The open pit and cyanide heap-leach project had company-reported reserves of 3.9 million tons of ore, grading 0.053 ounce of gold and 0.23 ounce of silver per ton. The deposit occurs near the surface and reaches depths of about 245 feet. Annual production was anticipated at about 40,000 ounces of gold.[11]

### INDUSTRIAL MINERALS

**Cement.**—Portland cement sales and attendant value decreased about 18% in 1987. During the same year, masonry cement production was essentially unchanged; however, value increased more than 13%. Changes in portland cement figures are attributed to a lengthy plant shutdown for repairs and decreased out-of-State sales. The only Government-owned cement plant in the Nation, and the only cement plant in South Dakota, was operated by the State near Rapid City. The business is administered by the seven-member South Dakota Cement Commission, which is appointed by the Governor. The facility can produce up to 1 million short tons of cement per year. Cement products are marketed in South Dakota, six aujacent States, and in Colorado. About 60% of the finished portland

cement was sold to ready-mixed concrete companies, 14% to highway contractors, 9% to other contractors, and 17% to various other consumers.

**Sand and Gravel (Construction).**—Construction sand and gravel production is surveyed by the U.S. Bureau of Mines for even-numbered years only; this chapter contains estimates for 1985 and 1987 and actual data for 1986. Data for odd-numbered years are based on annual company estimates. Estimated production and value in 1987 was down slightly from the previous year's level.

**Stone.**—Stone production is surveyed by the U.S. Bureau of Mines for odd-numbered years only; this chapter contains actual data 1985 and 1987 and estimates for 1986. Data for even-numbered years are based on annual company estimates.

*Crushed.*—Production and value of crushed stone in 1987 increased nearly 41% and 47%, respectively, establishing record highs. Limestone, which accounted for more than three-fourths of the crushed stone output, was produced by 8 companies from 11 quarries in 7 counties. Pennington County, in west-central South Dakota, was the source of most of the production. Quartzite and sandstone were produced by five companies at five quarries in Hanson, Mellette, Minnehaha, and Tripp Counties.

**Table 3.—South Dakota: Crushed stone[1] sold or used by producers in 1987, by use**

(Thousand short tons and thousand dollars)

| Use | Quantity | Value |
|---|---|---|
| Coarse aggregate (+ 1-1/2 inch): | | |
| Riprap and jetty stone | 44 | 269 |
| Filter stone | 64 | 331 |
| Coarse aggregate, graded: Concrete aggregate, coarse | 428 | 2,061 |
| Fine aggregate (-3/8 inch): Stone sand, bituminous mix or seal | 110 | 521 |
| Coarse and fine aggregates: | | |
| Graded road base or subbase | 261 | 843 |
| Other construction[2] | 205 | 878 |
| Other miscellaneous[3] | 974 | 1,909 |
| Other unspecified[4] | 2,984 | 11,682 |
| Total | 5,070 | 18,515 |

[1]Includes limestone, quartzite, and sandstone.
[2]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, stone sand (concrete), screenings (undesignated), and unpaved road surfacing.
[3]Includes cement manufacture, lime manufacture, and asphalt fillers or extenders.
[4]Includes production reported without a breakdown by end use and estimates for nonrespondents.

*Dimension.*—Granite from Grant County was the only rock type used in dimension stone production. Sales of products for construction and monument use were reported by five companies operating nine quarries in the Milbank area. Production and value posted slight declines from the previous year's estimates.

**Other Industrial Minerals.**—Common clay and shale decreased in both production and value during 1987. The decreases resulted from lower cement production at the South Dakota Cement Commission plant. Feldspar production and value decreased about 27% and 20%, respectively. The value of gem stones collected during the year was estimated to have remained about the same as that of 1986. Crude gypsum production increased almost 10%, and value decreased almost 13%. Gypsum was used mostly in cement production. Output and value of lime fell almost 23% and 39%, respectively, and included both hydrated lime and quicklime. Scrap mica production and value decreased more than 17% and 28%, respectively.

[1]State Mineral Officer, Bureau of Mines, Minneapolis, MN.
[2]Highway and Heavy Construction Magazine, June 1987, p. 36.
[3]Personal communication with South Dakota Department of Revenue.
[4]South Dakota Employment and Earnings Covered by Unemployment Insurance, 1987. South Dakota Dep. of Labor, p. 5.
[5]Homestake Mining Co. 1987 Annual Report to Stockholders.
[6]Wharf Resources Ltd. 1987 Annual Report to Stockholders.
[7]Mining Activity Digest. Engineering & Mining Journal International Directory, V. 14, No. 5, Oct. 30, 1987, p. 6.
[8]Engineering & Mining Journal, July 1987, p. 40.
[9]The Mining Record. Goldstake Proposing Joint Venture To Mine Gold Tailings, Sept. 9, 1987, p. 17.
[10]Lead Daily Call. Goldstake Site Toured, Sept. 4, 1987.
[11]St. Joe Gold Corp. Highlights of the 1987 Annual Meeting of Stockholders.

**Table 4.—Principal producers**

| Commodity and company | Address | Type of activity | County |
|---|---|---|---|
| Beryllium concentrate: | | | |
| Pacer Corp | Box 912<br>Custer, SD 57730 | Mine and plant | Custer. |
| Cement: | | | |
| South Dakota Cement Commission. | Box 360<br>Rapid City, SD 57709 | 3 rotary kilns | Pennington. |
| Clays: | | | |
| American Colloid Co | 5100 Suffield Ct.<br>Skokie, IL 60076 | Open pit and plant | Butte. |
| South Dakota Cement Commission. | Box 360<br>Rapid City, SD 57709 | Open pit | Pennington. |
| Feldspar: | | | |
| Pacer Corp | Box 912<br>Custer, SD 57730 | Open pits and dry-grinding plant. | Custer. |
| Gold: | | | |
| Homestake Mining Co | Box 875<br>Lead, SD 57754 | Underground mine and open pit, cyanidation mill, refinery. | Lawrence. |
| Wharf Resources (U.S.A.) Inc | Box 897<br>Lead, SD 57754 | Open pit and leach pads | Do. |
| Gypsum: | | | |
| South Dakota Cement Commission. | Box 360<br>Rapid City, SD 57709 | Open pit mine | Pennington. |
| Lime: | | | |
| Pete Lien & Sons Inc | Box 440<br>Rapid City, SD 57709 | Rotary and vertical kilns, continuous-hydrator plant. | Do. |
| Mica: | | | |
| Pacer Corp | Box 912<br>Custer, SD 57730 | Mine and dry-grinding plant | Custer. |
| Sand and gravel (construction, 1986): | | | |
| Birdsall Sand & Gravel Co | Box 767<br>Rapid City, SD 57709 | Pits and plants | Fall River, Pennington, Sully. |
| Fischer Sand & Gravel Co | Box 1034<br>Dickinson, ND 58601 | do | Charles Mix, Davison, Lawrence, Ziebach. |
| Mehlhoff Construction Co | Route 1, Box 25<br>Tripp, SD 57376 | Pit and plant | Hutchinson. |
| Myrl & Roy's Paving Inc | 1500 East 39th St. North<br>Sioux Falls, SD 57101 | Pits and plants | Minnehaha. |
| Sweetman Construction Inc | 100 South Dakota Ave.<br>Summit, SD 57266 | do | Minnehaha and Roberts. |
| Silver: | | | |
| Homestake Mining Co | Box 875<br>Lead, SD 57754 | See "Gold" | Lawrence. |
| Wharf Resources (U.S.A.) Inc | Box 897<br>Lead, SD 57754 | do | Do. |
| Stone: | | | |
| Crushed: | | | |
| Limestone: | | | |
| Pete Lien & Sons Inc | Box 440<br>Rapid City, SD 57709 | Quarries and plants | Custer and Pennington. |
| Northwestern Engineering Co. (Hills Materials Co.). | Box 2320<br>Rapid City, SD 57709 | do | Pennington. |
| South Dakota Cement Commission. | Box 360<br>Rapid City, SD 57709 | Quarry and plant | Do. |
| Sandstone-quartzite: | | | |
| Concrete Materials Co | Box 809<br>Sioux Falls, SD 57101 | do | Minnehaha. |
| L. G. Everist Inc | Box 829<br>Sioux Falls, SD 57101 | do | Do. |
| Spencer Quarries Inc | Box 25<br>Spencer, SD 57374 | do | Hanson. |
| Dimension: | | | |
| Granite: | | | |
| Cold Spring Granite Co. | 202 South 3d Ave.<br>Cold Spring, MN 56320 | Quarries and plant | Grant. |
| Dakota Granite Co | Box 1351<br>Milbank, SD 57252 | do | Do. |

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